Georgia-Pacific Corporation
Crossett Paper Operations
Packaged Products Division
P.O. Box 3333
Crossett, Arkansas
Telephone (870)567-8000

Mr. John Hepola
Chief, Air/Toxic & Inspection
Environmental Protection Agency, Region 6
1445 Ross Ave., Suite 1200
Dallas, TX 75202-2733

Re: Georgia-Pacific Crossett Paper Operations
Permit #597-AOP-R2 CSN 02-0013
Bleach Plant SN-30 Scrubber Performance Test

Dear Mr. Hepola,

Please find enclosed our bleach plant scrubber SN-30 initial performance test in accordance with 40 CFR Part 63.457 Test Methods and procedures. Environmental Services Company performed the testing on SN-30 bleach plant scrubber for chlorine, chlorine dioxide and chloroform. TEAM, Industrial Services performed the LDAR proportion on the closed vent system and negative pressure checks.

- In accordance with our alternative monitoring parameters for the scrubber vent an initial negative pressure check was completed to ensure negative pressure. TEAM, Ind. Performed test by smoke tube. Added to monthly and annual LDAR program.
- Motor amperage monitored during test. No load on motor is 15 amps. Alarm range set at 20 amps for low and 50 amps for high. Average amperage during test was 37 amp. Amperage monitored daily on Mill Process Information System.

If you have any questions or require further information I can be reached at (870) 567-8482 or by email hmweber@gapac.com.

Respectfully Submitted,

Helene Weber
Environmental Engineer

Cc: Alan Breshears, ADEQ 7000-1530-0005-3567-5744
Ginger Dumolt, ADEQ 7000-1530-0005-3567-5768
File, G-P

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write *"Return Receipt Requested"* on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Mr. John R. Hepola, Chief
Air/Toxic and Inspection Coordination Branch
Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

4a. Article Number: 7000 1530 0005 3567 5751

4b. Service Type
☐ Registered ☒ Certified
☐ Express Mail ☐ Insured
☒ Return Receipt for Merchandise ☐ COD

7. Date of Delivery: OCT 26 2001

5. Received By: *(Print Name)*

8. Addressee's Address *(Only if requested and fee is paid)*

6. Signature: *(Addressee or Agent)*
MICHAEL J. BAUMANN PCO USEPA
X

Is your RETURN ADDRESS completed on the reverse side?

Thank you for using Return Receipt Service.

PS Form **3811,** December 1994 102595-98-B-0229 Domestic Return Receipt

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write *"Return Receipt Requested"* on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

Ginger Dumolt
Air Division
ADEQ
8001 National Drive
Little Rock, AR 72219-8913

4a. Article Number: 7000 1530 0005 3567 5768

4b. Service Type
☐ Registered ☒ Certified
☐ Express Mail ☐ Insured
☒ Return Receipt for Merchandise ☐ COD

7. Date of Delivery: OCT 26 2001

5. Received By: *(Print Name)* Barbara Coy

8. Addressee's Address *(Only if requested and fee is paid)*

6. Signature: *(Addressee or Agent)*
X

Is your RETURN ADDRESS completed on the reverse side?

Thank you for using Return Receipt Service.

PS Form **3811,** December 1994 102595-98-B-0229 Domestic Return Receipt

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write *"Return Receipt Requested"* on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:

ADEQ
ATTN: Alan Breshears
925 E. Faulkner
El Dorado, AR 71731

4a. Article Number: 7000 1530 0005 3567 5744

4b. Service Type
☐ Registered ☒ Certified
☐ Express Mail ☐ Insured
☒ Return Receipt for Merchandise ☐ COD

7. Date of Delivery: 10-25

5. Received By: *(Print Name)* K Schaeffer

8. Addressee's Address *(Only if requested and fee is paid)*

6. Signature: *(Addressee or Agent)*
X K Schaeffer

Is your RETURN ADDRESS completed on the reverse side?

Thank you for using Return Receipt Service.

PS Form **3811,** December 1994 102595-98-B-0229 Domestic Return Receipt

ADEQ
ARKANSAS
Department of Environmental Quality

Weber file
XC 12/20/01

November 05, 2001

Helene Weber
Environmental Engineer
Georgia Pacific Corporation
Crossett Paper Operations
P.O. Box 3333
Crossett, AR 71635

CSN: 02-0013 Permit: 597-AOP-R2

Dear Ms. Weber:

This letter is to inform you that we hve completed our evaluation of the stack test report which was submitted on October 25, 2001. The results are in reference to testing performed on the sources outlined below. Operating parameters during the test are also outlined below.

Date Tested	Source Number	Source	Pollutant	Operating Parameter
09/29/01	SN-30	Bleach Plant	Cl2, ClO2,CHCl3	1717tpd/2100tpd

Upon my review of the source emsiion report for SN-30, it was noted that the referenced source was operating at 82% of permitted capacity. Section 18.1002(D) of Regulation 18 states that all emissions sampling must be performed with the equipment being tested at least at 90% of its permitted capacity.

Based on the aforementioned data, a decrease in allowable operating capacity will be imposed on SN-30 until such time a retest is conducted at a higher operating rate. The allowable operating rate, until the retest is completed, will be limited to 93%, which is 11% above the actual tested throughput on September 29, 2001.

If you have any questions, please feel free to contact me at 870-862-5941.

Sincerely,

Jean Floyd

Jean Floyd, R.E.M. #10952
Air Inspector
Copy: Ginger Dumolt

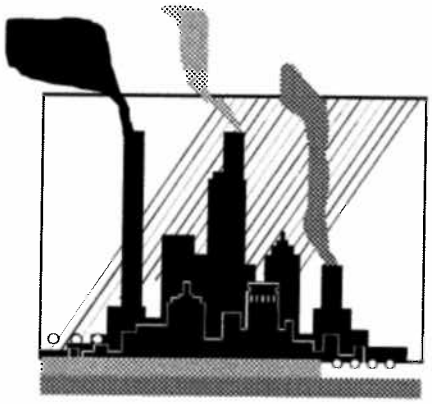
Environmental Services Company, Inc.
CORPORATE OFFICE:
13715 W. MARKHAM - P.O. BOX 55146
LITTLE ROCK, ARKANSAS 72215
501-221-2565 FAX: 501-221-1341
E-MAIL: corporate@esclabs.com
Website: www.esclabs.com

NORTHWEST BRANCH:
1107 CENTURY
SPRINGDALE, ARKANSAS 72762
501-750-1170 FAX: 501-750-1172
E-MAIL: nwbranch@esclabs.com
Website: www.esclabs.com

SURVEY OF SOURCE EMISSIONS

for

Georgia Pacific Paper Operations
Crossett, Arkansas



Operating Permit #597-AOP-R2 CSN 02-0013

SN-01 Bleach Plant Scrubber (Chlorine, Chlorine Dioxide and Chloroform)

Test Date: September 25, 2001

Acknowledgments and Certification

The staff of Environmental Services Company, Inc. (ESC) sincerely wishes to thank all personnel involved in the success of the testing program, especially Ms. Helene Weber of Georgia Pacific Paper Operations.

Having worked on this project, reviewed all data, and prepared this report, I hereby certify that the information contained herein is accurate and true according to the methods and procedures used.

Jeffrey Woosley
Special Projects Manager

Introduction

At the request of Ms. Helene Weber of Georgia Pacific Paper Operations, Environmental Services Company, Inc. (ESC) performed air emissions testing on September 25, 2001 at the Georgia Pacific Paper Operations facility in Crossett, Arkansas. The scope of the work consisted of testing the Bleach Plant Scrubber (SN-30) for chlorine, chlorine dioxide and chloroform as required by the facility's Operating Permit (Permit #597-AOP-R2 CSN 02-0013). The purpose of the testing was to learn whether the source in question was in compliance with the emission rates as set forth in the permit.

All testing referenced in this document was performed in accordance with reference methodology found in 40 CFR Part 60, Appendix A or Approved NCASI (National Council of the Paper Industry for Air and Stream Improvement, Inc.) methods. Chlorine, chlorine dioxide and chloroform emissions were determined according to NCASI Special Report No. 92-01 - "Method For Measuring Chlorine, Chlorine Dioxide and Chloroform Gaseous Emissions." The results of the testing program and supporting documentation are included in the following sections of this report.

Summary of Results

The results from this testing program are summarized in the attached tables. They provide a detail of the concentration, in milligrams per dry standard cubic feet (mg/dscf), and emission rate, in pounds per hour (lbs/hr), for chlorine, chlorine dioxide and chloroform.

RESULTS SUMMARY TABLE
BLEACH PLANT SCRUBBER (SN-30)

	Run #1	Run #2	Run #3	Average	Permit Limit
Date	09/25/01	09/25/01	09/25/01		
Time	1225-1255	1303-1333	1338-1408		
Parameter					
Chlorine					
Effluent concentration (mg/dscf)	ND	ND	ND	ND	--
Emission rate (lbs/hr)	ND	ND	ND	ND	8.0
Chlorine dioxide					
Effluent concentration (mg/dscf)	ND	ND	ND	ND	--
Emission rate (lbs/hr)	ND	ND	ND	ND	4.7

* No chlorine or chlorine dioxide were detected in the effluent gas stream

RESULTS SUMMARY TABLE
BLEACH PLANT SCRUBBER (SN-30)

	Run #1	Run #2	Run #3	Average	Permit Limit
Date	09/25/01	09/25/01	09/25/01		
Time	1022-1052	1106-1136	1145-1215		
Parameter					
Chloroform					
Effluent concentration (mg/dscf)	0.0104	0.0110	0.0123	0.0112	--
Emission rate (lbs/hr)	0.06	0.07	0.08	0.07	12.0

Operating Data

Attached is the operating data and other information maintained by Georgia Pacific Paper Operations during the testing.

The undersigned party acknowledges responsibility for and hereby certifies the accuracy of the operating and production data contained in this section.

Helene Weber
Printed Name of Responsible Party

Env Eng
Title

Signature

Oct 19, 01
Date

	L2 TPD 32l2adtp.pe	1A TPD 311aadtp.pe	1B TPD 311badtp.pe	Scrubber PH 32ai402	ORP MV 32aic416
9/25/2001 10:22	613	532	552	10.509	-160.5
9/25/2001 10:23	613	535	552	10.509	-160.7
9/25/2001 10:24	614	537	551	10.510	-160.8
9/25/2001 10:25	614	540	551	10.511	-160.9
9/25/2001 10:26	614	542	550	10.512	-161.1
9/25/2001 10:27	615	545	550	10.512	-161.2
9/25/2001 10:28	615	547	549	10.513	-161.3
9/25/2001 10:29	615	550	549	10.514	-161.4
9/25/2001 10:30	616	552	549	10.514	-161.5
9/25/2001 10:31	616	555	548	10.515	-161.6
9/25/2001 10:32	617	557	548	10.516	-161.8
9/25/2001 10:33	617	560	547	10.516	-161.9
9/25/2001 10:34	617	562	547	10.517	-162.0
9/25/2001 10:35	618	565	546	10.517	-162.1
9/25/2001 10:36	618	560	546	10.517	-162.2
9/25/2001 10:37	618	554	546	10.516	-162.4
9/25/2001 10:38	619	549	545	10.516	-162.5
9/25/2001 10:39	619	544	545	10.515	-162.6
9/25/2001 10:40	619	538	544	10.515	-162.7
9/25/2001 10:41	620	545	544	10.514	-162.8
9/25/2001 10:42	620	551	543	10.514	-163.0
9/25/2001 10:43	620	557	543	10.513	-163.1
9/25/2001 10:44	621	563	543	10.513	-163.2
9/25/2001 10:45	621	570	542	10.512	-163.3
9/25/2001 10:46	622	569	542	10.511	-163.4
9/25/2001 10:47	622	569	541	10.511	-163.5
9/25/2001 10:48	622	568	541	10.510	-163.7
9/25/2001 10:49	623	568	540	10.510	-163.8
9/25/2001 10:50	623	568	540	10.509	-163.9
9/25/2001 10:51	623	564	540	10.509	-164.0
9/25/2001 10:52	624	559	539	10.508	-164.1
9/25/2001 10:53	624	555	539	10.508	-164.3
9/25/2001 10:54	624	551	538	10.507	-164.4
9/25/2001 10:55	625	547	538	10.507	-164.5
9/25/2001 10:56	625	543	538	10.506	-164.6
9/25/2001 10:57	625	539	538	10.506	-164.8
9/25/2001 10:58	625	535	539	10.505	-164.9
9/25/2001 10:59	625	530	539	10.505	-165.0
9/25/2001 11:00	625	526	539	10.504	-165.2
9/25/2001 11:01	625	498	539	10.513	-165.3
9/25/2001 11:02	625	470	540	10.511	-165.4
9/25/2001 11:03	625	442	540	10.510	-165.6
9/25/2001 11:04	625	414	540	10.509	-165.7
9/25/2001 11:05	625	386	540	10.508	-165.8
9/25/2001 11:06	625	413	541	10.507	-166.0
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9/25/2001 11:08	625	466	541	10.504	-166.2
9/25/2001 11:09	625	493	541	10.503	-166.4
9/25/2001 11:10	625	520	541	10.502	-166.5
9/25/2001 11:11	625	523	542	10.501	-166.6
9/25/2001 11:12	625	526	542	10.499	-166.8
9/25/2001 11:13	625	530	542	10.498	-166.9
9/25/2001 11:14	625	533	542	10.497	-167.0
9/25/2001 11:15	625	536	543	10.496	-167.2
9/25/2001 11:16	625	533	543	10.494	-167.2
9/25/2001 11:17	625	531	543	10.493	-167.2
9/25/2001 11:18	625	528	543	10.492	-167.2
9/25/2001 11:19	625	525	544	10.491	-167.2
9/25/2001 11:20	625	523	544	10.490	-167.2
9/25/2001 11:21	625	531	544	10.488	-167.2
9/25/2001 11:22	625	538	544	10.487	-167.1
9/25/2001 11:23	625	546	545	10.486	-167.1
9/25/2001 11:24	625	554	545	10.485	-167.1
9/25/2001 11:25	625	562	545	10.484	-167.1
9/25/2001 11:26	625	562	545	10.482	-167.1

9/25/2001 11:27	625	562	545	10.482	-167.1
9/25/2001 11:28	625	562	546	10.481	-167.1
9/25/2001 11:29	625	562	546	10.480	-167.0
9/25/2001 11:30	625	563	546	10.480	-167.0
9/25/2001 11:31	625	563	546	10.479	-167.0
9/25/2001 11:32	625	563	547	10.478	-167.0
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9/25/2001 11:44	625	563	550	10.470	-166.6
9/25/2001 11:45	625	563	550	10.469	-166.5
9/25/2001 11:46	625	564	550	10.469	-166.5
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9/25/2001 11:52	625	551	551	10.465	-165.9
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9/25/2001 11:54	625	538	552	10.463	-165.8
9/25/2001 11:55	625	532	552	10.462	-165.7
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9/25/2001 11:58	625	552	553	10.459	-165.4
9/25/2001 11:59	625	558	553	10.459	-165.3
9/25/2001 12:00	625	565	553	10.458	-165.2
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9/25/2001 12:02	625	554	554	10.456	-165.0
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9/25/2001 12:15	625	567	557	10.445	-165.0
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9/25/2001 12:17	625	566	557	10.443	-165.1
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9/25/2001 12:45	625	518	540	10.426	-165.7
9/25/2001 12:46	625	516	540	10.427	-165.7
9/25/2001 12:47	625	514	540	10.427	-165.7
9/25/2001 12:48	625	512	540	10.427	-165.7
9/25/2001 12:49	625	510	540	10.428	-165.7
9/25/2001 12:50	625	508	541	10.428	-165.7
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9/25/2001 12:52	625	529	541	10.429	-165.7
9/25/2001 12:53	625	540	541	10.429	-165.7
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9/25/2001 12:55	625	561	541	10.430	-165.7
9/25/2001 12:56	625	561	542	10.430	-165.7
9/25/2001 12:57	625	560	542	10.430	-165.7
9/25/2001 12:58	625	560	542	10.431	-165.7
9/25/2001 12:59	625	559	542	10.431	-166.2
9/25/2001 13:00	625	559	542	10.431	-167.1
9/25/2001 13:01	625	559	542	10.432	-168.0
9/25/2001 13:02	625	558	543	10.432	-168.9
9/25/2001 13:03	625	558	543	10.433	-169.9
9/25/2001 13:04	625	557	543	10.433	-170.8
9/25/2001 13:05	625	557	543	10.433	-171.7
9/25/2001 13:06	625	556	543	10.434	-172.6
9/25/2001 13:07	625	556	543	10.434	-173.5
9/25/2001 13:08	625	556	543	10.434	-174.4
9/25/2001 13:09	625	555	544	10.440	-175.4
9/25/2001 13:10	625	555	544	10.458	-176.3
9/25/2001 13:11	625	558	544	10.476	-177.6
9/25/2001 13:12	625	561	544	10.493	-180.2
9/25/2001 13:13	625	564	544	10.511	-182.6
9/25/2001 13:14	625	567	544	10.529	-185.0
9/25/2001 13:15	625	570	545	10.547	-187.4
9/25/2001 13:16	625	567	545	10.565	-189.8
9/25/2001 13:17	625	564	545	10.583	-192.0
9/25/2001 13:18	625	562	545	10.601	-193.8
9/25/2001 13:19	625	559	545	10.618	-195.5
9/25/2001 13:20	625	556	545	10.636	-197.3
9/25/2001 13:21	625	553	546	10.654	-199.1
9/25/2001 13:22	625	550	546	10.672	-200.9
9/25/2001 13:23	625	547	546	10.690	-204.0
9/25/2001 13:24	625	544	546	10.708	-205.3
9/25/2001 13:25	625	541	546	10.726	-206.5
9/25/2001 13:26	625	538	546	10.743	-207.8
9/25/2001 13:27	625	535	547	10.761	-209.0
9/25/2001 13:28	625	533	547	10.779	-210.3
9/25/2001 13:29	625	530	547	10.797	-211.5
9/25/2001 13:30	625	527	547	10.815	-212.8
9/25/2001 13:31	625	534	547	10.833	-214.0
9/25/2001 13:32	625	541	547	10.851	-216.3
9/25/2001 13:33	625	548	547	10.868	-217.3
9/25/2001 13:34	625	555	548	10.875	-217.8
9/25/2001 13:35	625	562	548	10.878	-218.4
9/25/2001 13:36	625	563	548	10.881	-219.0
9/25/2001 13:37	625	564	548	10.884	-219.6
9/25/2001 13:38	625	564	548	10.887	-220.1
9/25/2001 13:39	625	565	548	10.890	-220.7
9/25/2001 13:40	625	565	549	10.893	-221.3
9/25/2001 13:41	625	566	549	10.896	-221.8
9/25/2001 13:42	625	566	549	10.899	-222.4

9/25/2001 13:43	625	567	549	10.902	-223.0
9/25/2001 13:44	625	567	549	10.905	-223.6
9/25/2001 13:45	625	568	549	10.909	-224.1
9/25/2001 13:46	625	568	550	10.912	-224.7
9/25/2001 13:47	625	569	550	10.915	-225.3
9/25/2001 13:48	625	569	550	10.918	-225.8
9/25/2001 13:49	625	570	550	10.921	-226.4
9/25/2001 13:50	625	570	550	10.924	-227.0
9/25/2001 13:51	625	564	550	10.927	-227.6
9/25/2001 13:52	625	557	551	10.930	-228.1
9/25/2001 13:53	625	551	551	10.933	-229.1
9/25/2001 13:54	625	544	551	10.936	-229.2
9/25/2001 13:55	625	538	551	10.940	-229.3
9/25/2001 13:56	625	538	551	10.943	-229.4
9/25/2001 13:57	625	539	551	10.946	-229.5
9/25/2001 13:58	625	539	552	10.949	-229.6
9/25/2001 13:59	625	540	552	10.951	-229.7
9/25/2001 14:00	625	540	552	10.949	-229.8
9/25/2001 14:01	625	541	552	10.947	-229.9
9/25/2001 14:02	625	541	552	10.945	-229.9
9/25/2001 14:03	625	541	552	10.943	-230.0
9/25/2001 14:04	625	542	552	10.941	-230.1
9/25/2001 14:05	625	542	553	10.939	-230.2
9/25/2001 14:06	625	543	553	10.937	-230.3
9/25/2001 14:07	625	543	553	10.935	-230.4
9/25/2001 14:08	625	544	553	10.934	-230.5
Average	**624**	**547**	**546**	**10.560**	
Total Bleached	**1717**				

Sampling and Analysis Procedure

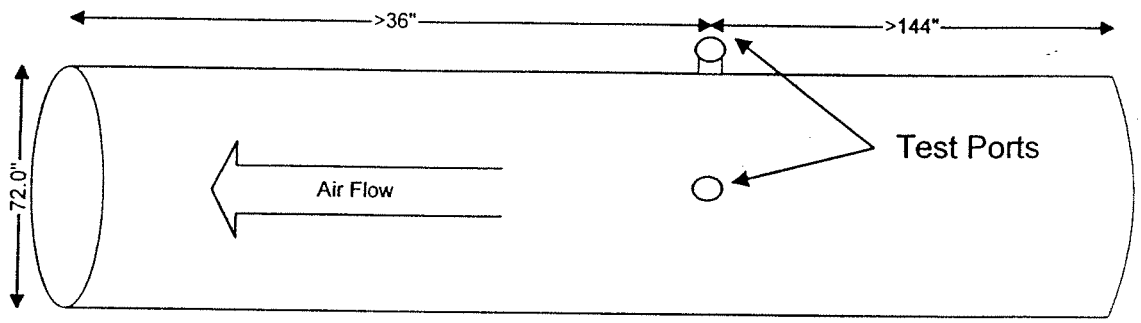
The emissions testing conducted on the source in question was performed in accordance with methodology as outlined in 40 CFR Part 60, Appendix A or approved NCASI methods. Specifically, the following methods are referenced in this sampling program:

- ⇒ Method 1 — Sample and Velocity Traverses for Stationary Sources
- ⇒ Method 2 — Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
- ⇒ Method 3 — Gas Analysis for the Determination of Dry Molecular Weight (Orsat Analysis Method)
- ⇒ Method 4 — Determination of Moisture Content in Stack Gasses
- ⇒ NCASI 92-01 — Method for Measuring Chlorine, Chlorine Dioxide and Chloroform Gaseous Emissions

Test Location and Stack Schematics

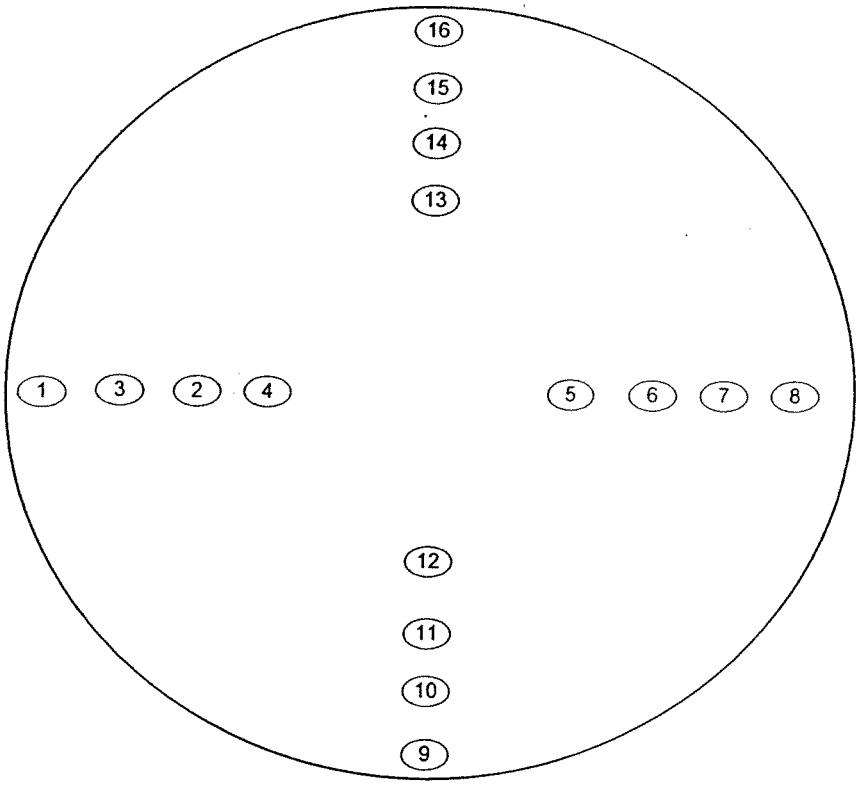
The following pages represent schematic diagrams of the source tested. The diagrams portray the test ports, stack dimensions, and traverse point locations that were employed in the testing program.

Traverse points were determined by Method 1 of 40 CFR Part 60, Appendix A - "Sample and Velocity Traverses for Stationary Sources." Method 1 implements the use of stack dimensions for the determination of the location of sample ports and traverse points. The diameter of the duct is taken into consideration in order to meet criteria concerning the location of test port openings. Traverse points are determined as a percentage of the stack diameter as measured from the inside wall of the stack. Method 1 provides guidelines for the calculation and location of each traverse point based on the stack diameter.



GEORGIA-PACIFIC CORPORATION
CROSSETT, ARKANSAS

SN-30 Bleach Plant
Side View



Sample Point	Location
1 and 9	2.304"
2 and 10	7.560"
3 and 11	13.968"
4 and 12	25.256"
5 and 13	48.744"
6 and 14	58.032"
7 and 15	64.440"
8 and 16	69.696"

GEORGIA-PACIFIC CORPORATION
CROSSETT, ARKANSAS

SN-30 Bleach Plant
Sample Points

SOURCE TEST NOMENCLATURE AND CALCULATIONS

SOURCE TEST CALCULATIONS
USEPA Method 2 - Volumetric Flow Rate

Definitions:

C_p	Pitot correction factor, dimensionless
$\sqrt{\Delta P}$	Average of the square roots of the pressure heads, in. H_2O
D_s	Stack diameter or dimensions, ft
T_s	Average stack temperature, °F
P_{bar}	Barometric pressure at sampling site, in. Hg
P_g	Stack static pressure, in. Hg
B_{ws}	Water vapor in the gas stream, %
$\%CO_2$	Percent CO_2 by volume, dry basis
$\%O_2$	Percent O_2 by volume, dry basis
$\%CO+\%N_2$	Percent $CO+N_2$ by volume, dry basis

Calculations:

M_d Dry molecular weight of stack gasses, lb/lb-mole =
$0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%CO + \%N_2)$

P_s Absolute stack gas pressure, in. Hg = $P_{bar} + P_g$

M_s Wet molecular weight of stack gasses, lb/lb-mole = $M_d(1 - B_{ws}) + 18.0B_{ws}$

V_s Velocity in the stack, ft/sec = $85.49C_p\sqrt{\Delta P}_{avg}\sqrt{\dfrac{460 + T_s}{P_s M_s}}$

A Area of stack, ft^2 = $\left(\dfrac{D_s}{2}\right)^2$ x 3.1416 or cross-section length x width

$Q_{std(dscf/hr)}$ Average stack gas dry volumetric flow rate, dscf/hr =

$$3600(1 - B_{ws})V_s A\left[\frac{528}{460 + T_s} \times \frac{P_s}{29.92}\right]$$

SOURCE TEST CALCULATIONS
USEPA Method 4 - Moisture Content in Stack Gasses

Definitions

T_m	Average meter temperature,°F
ΔH	Average pressure differential across the orifice meter, in. H_2O
P_{bar}	Barometric pressure at sampling site, in. Hg
P_g	Stack static pressure, in. Hg
V_{ic}	Total volume of liquid collected in impingers and silica gel, mls
V_m	Volume of gas sample as measured by dry gas meter, cf
T_{min}	Total sampling time, minutes
Y	Dry gas meter calibration factor

Calculations

$V_{w(std)}$ Volume of water vapor in the gas sample, dscf = $0.04707V_{ic}$

$V_{m(std)}$ Volume of metered gas sample, dscf = $17.64V_mY\dfrac{P_{bar}+\left(\dfrac{\Delta H}{13.9}\right)}{460+T_m}$

B_{ws} Water vapor in the gas stream, proportion by volume = $\dfrac{V_{w(std)}}{V_{m(std)}+V_{w(std)}}$

SOURCE TEST DEFINITIONS
Determination of Chlorine and Chlorine Dioxide

T_m	Average meter temperature, °F
ΔH	Average pressure differential across the orifice meter, in. H_2O
P_{bar}	Barometric pressure at sampling site, in. Hg
$V_{m(l)}$	Volume of gas sample as measured by dry gas meter, liters
T_{min}	Total sampling time, minutes
Y	Dry gas meter calibration factor
T_n	Amount of titrant required to reach first endpoint, ml
T_a	Amount of titrant required to go through first and to second endpoint, ml
$\overline{N}$	Normality of sodium thiosulfate solution
MW Cl_2	Molecular weight of chlorine
MW ClO_2	Molecular weight of chlorine dioxide
E_qI_2N	Iodine equivalent of neutral solution
E_qI_2A	Iodine equivalent of acid solution
Q_{std}	Average stack gas dry volumetric flow rate, dscf/hr

SOURCE TEST CALCULATIONS
Determination of Chlorine and Chlorine Dioxide

$V_{m(cf)}$ Volume of gas sample as measured by dry gas meter, $ft^3 = V_{m(l)} \times 0.035315$

E_qI_2N Iodine equivalent of neutral solution = $\frac{T_n \times \overline{N}}{1000}$

E_qI_2A Iodine equivalent of acid solution = $\frac{T_a \times \overline{N}}{1000}$

$V_{m(std)}$ Volume of metered gas sample, dscf = $17.64 V_{m(cf)} Y \frac{P_{bar} + \left(\frac{\Delta H}{13.9}\right)}{460 + T_m}$

Cl_2 moles Moles of chlorine in sample = $\frac{(5 \times E_qI_2N) - E_qI_2A}{8}$

ClO_2 moles Moles of chlorine dioxide in sample = $\frac{E_qI_2N - E_qI_2N}{4}$

C_{Cl2} Concentration of chlorine in sample, mg/dscf = $\frac{Cl_{2\,moles} \times MW\ Cl_2 \times 1000}{V_{m(std)}}$

C_{ClO2} Concentration of chlorine dioxide in sample, mg/dscf = $\frac{ClO_{2\,moles} \times MW\ ClO_2 \times 1000}{V_{m(std)}}$

E_{Cl2} Emission rate of chlorine, lbs/hr = $C_{Cl2} \times 2.2046E-06 \times Q_{std}$

E_{ClO2} Emission rate of chlorine dioxide, lbs/hr = $C_{ClO2} \times 2.2046E-06 \times Q_{std}$

SOURCE TEST CALCULATIONS
Determination of Chloroform

Definitions

T_m	Average meter temperature, °F
ΔH	Average pressure differential across the orifice meter, in. H_2O
P_{bar}	Barometric pressure at sampling site, in. Hg
$V_{m(l)}$	Volume of gas sample as measured by dry gas meter, liters
T_{min}	Total sampling time, minutes
Y	Dry gas meter calibration factor
M_{Chl}	Total amount of chloroform collected on charcoal tubes, ug
Q_{std}	Average stack gas dry volumetric flow rate, dscf/hr

Calculations

$V_{m(cf)}$ Volume of gas sample as measured by dry gas meter, $ft^3 = V_{m(l)} \times 0.035315$

$V_{m(std)}$ Volume of metered gas sample, dscf $= 17.64 V_{m(cf)} Y \dfrac{P_{bar} + \left(\dfrac{\Delta H}{13.9}\right)}{460 + T_m}$

C_{Chl} Concentration of chloroform in sample, mg/dscf $= \dfrac{M_{Chl} \times 0.001}{V_{m(std)}}$

E_{Chl} Emission rate of chloroform, lbs/hr $= C_{Chl} \times 2.2046E-06 \times Q_{std}$

SUMMARY OF TEST DATA AND FIELD DATA

SUMMARY OF TEST DATA
NCASI METHOD FOR CHLORINE AND CHLORINE DIOXIDE EMISSIONS

		Run #1	Run #2	Run #3
	Identification:	SN-30	SN-30	SN-30
	Date:	09/25/01	09/25/01	09/25/01
	Time:	1225-1255	1303-1333	1338-1408
T_m	Average meter temperature, °F	92	95	94
ΔH	Average pressure differential across the orifice meter, in. H_2O	0.2000	0.2000	0.2000
P_{bar}	Barometric pressure at sampling site, in Hg.	30.28	30.28	30.28
$V_{m(l)}$	Volume of gas sample as measured by dry gas meter, liters	9.40	9.32	0.00
$V_{m(cf)}$	Volume of gas sample as measured by dry gas meter, cf	0.3320	0.3291	0.0000
T_{min}	Total sampling time, minutes	30.0	30.0	30.0
Y	Dry gas meter calibration factor	0.9912	0.9912	0.9912
T_n	Amount of titrant required to reach first endpoint, ml	ND	ND	ND
T_a	Amount of titrant required to go through first and to second endpoint, ml	ND	ND	ND
$\overline{N}$	Normality of sodium thiosulfate solution	0.1	0.1	0.1
Mw Cl_2	Molecular weight of chlorine	70.91	70.91	70.91
Mw ClO_2	Molecular weight of chlorine dioxide	67.45	67.45	67.45
E_qI_2N	Iodine equivalent of neutral titration	ND	ND	ND
E_qI_2A	Iodine equivalent of acid titration	ND	ND	ND
$V_{m(std)}$	Volume of metered gas sample, dscf	0.3185	0.3141	0.0000
Q_{std}	Average stack gas dry volumetric flow rate, dscf/hr	2,712,920.46	2,815,125.97	2,861,754.29
$Cl_{2\ moles}$	Moles of chlorine in sample	ND	ND	ND
$ClO_{2\ moles}$	Moles of chlorine dioxide in sample	ND	ND	ND
C_{Cl2}	Concentration of chlorine in sample, mg/dscf	ND	ND	ND
C_{ClO2}	Concentration of chlorine dioxide in sample, mg/dscf	ND	ND	ND
E_{Cl2}	Emission rate of chlorine, lbs/hr	ND	ND	ND
E_{ClO2}	Emission rate of chlorine dioxide, lbs/hr	ND	ND	ND

ND = No chlorine or chlorine dioxide detected in the effluent gas stream

SUMMARY OF TEST DATA
NCASI METHOD FOR CHLOROFORM EMISSIONS

		Run #1	Run #2	Run #3
	Identification:	SN-30	SN-30	SN-30
	Date:	09/25/01	09/25/01	09/25/01
	Time:	1022-1052	1106-1136	1145-1215
T_m	Average meter temperature, °F	77	89	90
ΔH	Average pressure differential across the orifice meter, in. H_2O	0.2000	0.2000	0.2000
P_{bar}	Barometric pressure at sampling site, in Hg.	30.28	30.28	30.28
$V_{m(l)}$	Volume of gas sample as measured by dry gas meter, liters	15.44	15.68	15.63
$V_{m(cf)}$	Volume of gas sample as measured by dry gas meter, cf	0.5453	0.5537	0.5520
T_{min}	Total sampling time, minutes	30.0	30.0	30.0
Y	Dry gas meter calibration factor	0.9912	0.9912	0.9912
M_{Chl}	Total amount of chloroform collected on charcoal tubes, ug	5.60	5.90	6.55
$V_{m(std)}$	Volume of metered gas sample, dscf	0.5378	0.5343	0.5316
Q_{std}	Average stack gas dry volumetric flow rate, dscf/hr	2,828,784.77	2,847,624.50	2,873,058.13
C_{Chl}	Concentration of chloroform in sample, mg/dscf	0.0104	0.0110	0.0123
E_{Chl}	Emission rate of chloroform, lbs/hr	0.06	0.07	0.08

SUMMARY OF TEST DATA
USEPA METHOD 2
Volumetric Flow Rate

		Run #1	Run #2	Run #3
	Identification:	SN-30	SN-30	SN-30
	Date:	09/25/01	09/25/01	09/25/01
	Time:	1225-1255	1303-1333	1338-1408
C_p	Pitot correction factor, dimensionless	0.840	0.840	0.840
$\sqrt{\Delta P}$	Average of the square roots of the pressure heads, in. H_2O	0.5760	0.5977	0.6076
D_s	Stack diameter, ft.	6.0000	6.0000	6.0000
STK L	Stack length, ft.	0.0000	0.0000	0.0000
STK W	Stack width, ft.	0.0000	0.0000	0.0000
T_s	Average stack temperature, °F	132	132	132
P_{bar}	Barometric pressure at sampling site, in Hg.	30.28	30.28	30.28
P_g	Stack static pressure, in. Hg	-1.10	-1.10	-1.10
$\%CO_2$	Percent CO_2 by volume, dry basis	0.0	0.0	0.0
$\%O_2$	Percent O_2 by volume, dry basis	20.0	20.0	20.0
$\%CO+N_2$	Percent $CO+N_2$ by volume, dry basis	80.0	80.0	80.0
M_d	Dry molecular weight of stack gasses, lb/lb-mole	28.8000	28.8000	28.8000
P_s	Absolute stack gas pressure, in. Hg	29.18	29.18	29.18
B_{ws}	Water vapor in the gas stream, proportion by volume	0.1411	0.1411	0.1411
M_s	Wet molecular weight of stack gasses lb/lb-mole	27.2766	27.2766	27.2766
V_s	Velocity in the stack, ft/sec	35.6730	37.0170	37.6301
A	Area of the stack, ft^2	28.2744	28.2744	28.2744
Q_{std}	Average stack gas dry volumetric flow rate, dscf/hr	2,712,920.46	2,815,125.97	2,861,754.29

SUMMARY OF TEST DATA
USEPA METHOD 2
Volumetric Flow Rate

		Run #1	Run #2	Run #3
	Identification:	SN-30	SN-30	SN-30
	Date:	09/25/01	09/25/01	09/25/01
	Time:	1022-1052	1106-1136	1145-1215
C_p	Pitot correction factor, dimensionless	0.840	0.840	0.840
$\sqrt{\Delta P}$	Average of the square roots of the pressure heads, in. H_2O	0.6006	0.6046	0.6100
D_s	Stack diameter, ft.	6.0000	6.0000	6.0000
STK L	Stack length, ft.	0.0000	0.0000	0.0000
STK W	Stack width, ft.	0.0000	0.0000	0.0000
T_s	Average stack temperature, °F	132	132	132
P_{bar}	Barometric pressure at sampling site, in Hg.	30.28	30.28	30.28
P_g	Stack static pressure, in. Hg	-1.10	-1.10	-1.10
$\%CO_2$	Percent CO_2 by volume, dry basis	0.0	0.0	0.0
$\%O_2$	Percent O_2 by volume, dry basis	20.0	20.0	20.0
$\%CO+N_2$	Percent $CO+N_2$ by volume, dry basis	80.0	80.0	80.0
M_d	Dry molecular weight of stack gasses, lb/lb-mole	28.8000	28.8000	28.8000
P_s	Absolute stack gas pressure, in. Hg	29.18	29.18	29.18
B_{ws}	Water vapor in the gas stream, proportion by volume	0.1411	0.1411	0.1411
M_s	Wet molecular weight of stack gasses lb/lb-mole	27.2766	27.2766	27.2766
V_s	Velocity in the stack, ft/sec	37.1966	37.4443	37.7787
A	Area of the stack, ft^2	28.2744	28.2744	28.2744
Q_{std}	Average stack gas dry volumetric flow rate, dscf/hr	2,828,784.77	2,847,624.50	2,873,058.13

GEORGIA PACIFIC PAPER OPERATIONS

CROSSETT, ARKANSAS

SEPTEMBER 2001

SUMMARY OF TEST DATA
USEPA METHOD 4
Moisture Content in Stack Gasses

		Run #1
	Identification:	SN-30
	Date:	09/25/01
	Time:	1020-1050
T_m	Average meter temperature, °F	78
ΔH	Average pressure differential across the orifice meter, in. H_2O	2.0000
P_{bar}	Barometric pressure at sampling site, in. Hg	30.28
Vic	Total volume of liquid collected in impingers and silica gel, mls	77.2
V_m	Volume of gas sample as measured by the dry gas meter, cf	22.269
T_{min}	Total sampling time, minutes	30.0
Y	Dry gas meter calibration factor	0.996
$V_{w(std)}$	Volume of water vapor in the gas sample, dscf	3.6338
$V_{m(std)}$	Volume of metered gas sample, dscf	22.1277
B_{ws}	Water vapor in the gas stream, proportion by volume	0.1411

STACK SAMPLING FIELD DATA

Plant Name: GP Crossett Stack Name: SN-30

Operator: JAN Run Number: 1 EPA Method: NCASI - Cl, ClO_2

Date: 9/24/01 Start Time: 1225 Stop Time: 1255

Stack Dia. (ft): 6.0000 Bar. Pres. (in. Hg): 30.28 Static Pres. (in Hg): -1.10

Probe Tip Diameter (in): N/A Pitot Factor: 0.840 Meter Factor:

Control Number: C109010420 K Factor:

Percent O_2: 20.0 Percent CO_2: 0.0 Percent $CO+N_2$: 80.0

Pre-Leak Checks: Pitots: ok System: ok @ 20" Hg < 0.01 L

Post-Leak Checks: Pitots: ok System: ok @ 24" Hg < 0.01 L

Point	Sample Time	Dry Gas Meter Reading	Sample Flow L/MIN	ΔH Inches H_2O	Dry Gas Meter Temperature °F		L.VAC. In. Hg Gauge	Dryer Temp. °F	Ambient Temp. °F	ΔP Inches H_2O	Stack Temp. °F
		2562.05			Inlet	Outlet					
1	5.0/1230	2564	0.30	0.20	95	93	2.0	79	78	0.68	130
2	5.0/1235	2565	0.30	0.20	93	91	2.0	74	75	0.75	131
3	5.0/1240	2566	0.30	0.20	92	89	2.0	70	72	0.20	132
4	5.0/1245	2568	0.30	0.20	93	91	2.0	68	77	0.23	133
5	5.0/1250	2569	0.30	0.20	94	92	2.0	66	75	0.22	132
6	5.0/1255	2571.45	0.30	0.20	94	91	2.0	65	75	0.26	132
7										0.33	131
8										0.35	132
9										0.42	133
10										0.36	132
11										0.24	133
12										0.23	132
13										0.26	132
14										0.28	133
15										0.31	133
16										0.41	132
17											
18											
19											
20											
21											
22											
23											
24											
25											
	30	9.40	0.3000	0.2000	92					√0.5740	132

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STACK SAMPLING FIELD DATA

Plant Name: GP Crossett Stack Name: SN-30

Operator: JAN Run Number: 2 EPA Method: NCASI - Cl, Cl$_2$

Date: 9/25/01 Start Time: 1303 Stop Time: 1333

Stack Dia. (ft): 6.0000 Bar. Pres. (in. Hg): 30.28 Static Pres. (in Hg): -1.10

Probe Tip Diameter (in): N/A Pitot Factor: 0.840 Meter Factor:

Control Number: C1C901042L K Factor:

Percent O_2: 20.0 Percent CO_2: 0.0 Percent $CO+N_2$: 80.0

Pre-Leak Checks: Pitots: ok System: ok @ 22" Hg < 0.01 "

Post-Leak Checks: Pitots: ok System: ok @ 23" Hg < 0.01 "

Point	Sample Time	Dry Gas Meter Reading	Sample Flow L/MIN	ΔH Inches H_2O	Dry Gas Meter Temperature °F		L.VAC. In. Hg Gauge	Dryer Temp. °F	Ambient Temp. °F	ΔP Inches H_2O	Stack Temp. °F
		2573.20			Inlet	Outlet					
1	5.0/1308	2574	0.30	0.20	93	91	1.5	75	77	0.62	131
2	5.0/1313	2576	0.30	0.20	94	92	2.0	72	78	0.51	131
3	5.0/1318	2577	0.30	0.20	96	94	2.0	69	80	0.28	132
4	5.0/1323	2579	0.30	0.20	98	95	2.0	67	79	0.25	131
5	5.0/1328	2580	0.30	0.20	98	96	2.0	66	80	0.24	132
6	5.0/1333	2582.52	0.30	0.20	98	96	2.0	65	80	0.24	132
7										0.31	133
8										0.35	132
9										0.65	132
10										0.60	132
11										0.40	131
12										0.32	132
13										0.27	132
14										0.26	132
15										0.29	133
16										0.31	132
17											
18											
19											
20											
21											
22											
23											
24											
25											
	30	9.32	0.3000	0.2000	95					√0.5177	132

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STACK SAMPLING FIELD DATA

Plant Name: GP Crossett Stack Name: SN - 30

Operator: JAN Run Number: 3 EPA Method: NCASI - Cl, ClO2

Date: 9/25/01 Start Time: 1332 Stop Time: 1908

Stack Dia. (ft): 6.0000 Bar. Pres. (in. Hg): 30.28 Static Pres. (in Hg): -1.10

Probe Tip Diameter (in): N/A Pitot Factor: 0.840 Meter Factor:

Control Number: 010901042 2 K Factor:

Percent O_2: ~~X~~ 20.0 Percent CO_2: 0.0 Percent $CO+N_2$: 80.0

Pre-Leak Checks: Pitots: ok System: ok @ 21" Hg < 0.01

Post-Leak Checks: Pitots: ok System: ok @ 25" Hg < 0.01

Point	Sample Time	Dry Gas Meter Reading	Sample Flow L/MIN	ΔH Inches H_2O	Dry Gas Meter Temperature °F		L.VAC. In. Hg Gauge	Dryer Temp. °F	Ambient Temp. °F	ΔP Inches H_2O	Stack Temp. °F
		2584.25			Inlet	Outlet					
1	5.0/1343	2585	0.30	~~0.20~~ 0.20	98	96	1.5	79	80	0.69	131
2	5.0/1348	2587	0.30	0.20	98	96	1.5	76	80	0.70	132
3	5.0/1353	2589	0.30	0.20	97	94	2.0	72	82	0.30	131
4	5.0/1358	2590	0.30	0.20	98	96	2.0	69	82	0.23	132
5	5.0/1403	2592	0.30	0.20	100	98	2.0	66	82	0.23	133
6	5.0/1408	2594.26	0.30	0.20	100	98	2.0	65	80	0.26	133
7										0.30	132
8										0.36	133
9										0.71	132
10										0.71	132
11										0.30	132
12										0.27	133
13										0.25	133
14										0.26	132
15										0.32	132
16										0.35	132
17											
18											
19											
20											
21											
22											
23											
24											
25											
	30	17.01	0.3000	0.2000	97					10.6076	132

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STACK SAMPLING FIELD DATA

Plant Name: GPC Crossett Stack Name: 20-30

Operator: JRW Run Number: 1 EPA Method: NCASE - CHLOROFORM

Date: 09/25/01 Start Time: 1022 Stop Time: 1052

Stack Dia. (ft): 6.0000 Bar. Pres. (in. Hg): 30.28 Static Pres. (in Hg): - 1.10

Probe Tip Diameter (in): N/A Pitot Factor: 0.840 Meter Factor: 0.9912

Control Number: 010901041 7 K Factor:

Percent O_2: 20.9 Percent CO_2: 0.0 Percent $CO+N_2$: 80.0

Pre-Leak Checks: Pitots: OK System: OK @ 21" Hg < 0.005 0.01 L

Post-Leak Checks: Pitots: OK System: OK @ 23" Hg < 0.01 L

Point	Sample Time	Dry Gas Meter Reading	Sample Flow L/MIN	ΔH Inches H_2O	Dry Gas Meter Temperature °F		L.VAC. In. Hg Gauge	Dryer Temp. °F	Ambient Temp. °F	ΔP Inches H_2O	Stack Temp. °F
		2510.02			Inlet	Outlet					
1	5.0/1022	2513.	0.50	0.20	72	72	3.0		69.0	0.64	131
2	5.0/1027	2515	0.50	0.20	74	72	4.0		69.0	0.51	131
3	5.0/1032	2518	0.50	0.20	77	74	4.0		71.0	0.31	132
4	5.0/1037	2520.0	0.50	0.20	80	76	4.0		69	0.27	133
5	5.0/1042	2523	0.50	0.20	83	79	5.0		74	0.23	133
6	5.0/1047	2525.46	0.50	0.20	87	83	5.0		74	0.25	132
7										0.30	133
8										0.32	132
9										0.68	131
10										0.59	132
11										0.43	133
12										0.35	133
13										0.26	133
14										0.21	132
15										0.25	132
16										0.27	133
17											
18											
19											
20											
21											
22											
23											
24											
25											
	30	15 44	0.5000	0.2000	77					0.6006	132

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STACK SAMPLING FIELD DATA

Plant Name: GP Crossett Stack Name: SN-30

Operator: JAN Run Number: 2 EPA Method: NCASI - Chloroform

Date: 9/27/07 Start Time: 1106 Stop Time: 1136

Stack Dia. (ft): 6.0000 Bar. Pres. (in. Hg): 30.28 Static Pres. (in Hg): -1.10

Probe Tip Diameter (in): N/A Pitot Factor: 0.840 Meter Factor:

Control Number: 0109010-18 K Factor:

Percent O_2: 20.0 Percent CO_2: 0.0 Percent $CO+N_2$: 80.0

Pre-Leak Checks: Pitots: ok System: ok @ 20" Hg < 0.01 L

Post-Leak Checks: Pitots: ok System: ok @ 23" Hg < 0.01 L

Point	Sample Time	Dry Gas Meter Reading	Sample Flow L/MIN	ΔH Inches H_2O	Dry Gas Meter Temperature °F		L.VAC. In. Hg Gauge	Dryer Temp. °F	Ambient Temp. °F	ΔP Inches H_2O	Stack Temp. °F
		2528.61			Inlet	Outlet					
1	5.0/1111	2531	0.50	0.20	88	86	4.0		71	0.59	132
2	5.0/1116	2534	0.50	0.20	82	85	4.0		74	0.68	132
3	5.0/1121	2536	0.50	0.20	89	86	4.0		73	0.39	133
4	5.0/1126	2539	0.50	0.20	90	88	4.0		74	0.72	133
5	5.0/1131	2541	0.50	0.30	92	90	5.0		72	0.24	132
6	5.0/1136	2544.29	0.50	0.20	92	89	5.0		76	0.23	133
7										0.27	132
8										0.32	137
9										0.69	131
10										0.73	132
11										0.33	132
12										0.29	133
13										0.26	132
14										0.29	132
15										0.25	133
16										0.24	133
17											
18											
19											
20											
21											
22											
23											
24											
25											
	30	1.548	0.5000	0.2000		89				0.6046	132

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STACK SAMPLING FIELD DATA

Plant Name: GP Crossett Stack Name: SN-30

Operator: JAN Run Number: 3 EPA Method: NCASI - Chloroform

Date: 9/25/01 Start Time: 1145 Stop Time: 1215

Stack Dia. (ft): 6.0000 Bar. Pres. (in. Hg): 30.28 Static Pres. (in Hg): -1.10

Probe Tip Diameter (in): N/A Pitot Factor: 0.840 Meter Factor:

Control Number: 0109010405 K Factor:

Percent O_2: 20.0 Percent CO_2: 0.0 Percent $CO+N_2$: 80.0

Pre-Leak Checks: Pitots: ok System: ok @ 21" Hg < 0.01 L

Post-Leak Checks: Pitots: ok System: ok @ 22" Hg < 0.01 L

Point	Sample Time	Dry Gas Meter Reading	Sample Flow L/MIN	ΔH Inches H_2O	Dry Gas Meter Temperature °F		L.VAC. In. Hg Gauge	Dryer Temp. °F	Ambient Temp. °F	ΔP Inches H_2O	Stack Temp. °F
		2544.70			Inlet	Outlet					
1	5.0/1150	2547	0.50	0.20	91	89	4.0		73	0.65	132
2	5.0/1155	2549	0.50	0.20	90	87	4.0		72	0.66	132
3	5.0/1200	2552	0.50	0.20	90	87	5.0		75	0.33	133
4	5.0/1205	2555	0.50	0.20	91	88	5.0		75	0.29	132
5	5.0/1210	2557	0.50	0.20	91	89	6.0		74	0.24	132
6	5.0/1215	2560.33	0.50	0.20	94	92	6.0	↓	78	0.26	133
7										0.33	132
8										0.29	131
9										0.67	131
10										0.57	132
11										0.43	132
12										0.32	133
13										0.24	132
14										0.26	133
15										0.29	132
16										0.34	133
17											
18											
19											
20											
21											
22											
23											
24											
25											
	30	15.63	0.5000	0.2000	90					0.6100	132

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STACK SAMPLING FIELD DATA

Plant Name: GP Crossett Stack Name: SN-30

Operator: JAN Run Number: 1 EPA Method: 4

Date: 9/25/01 Start Time: 1020 Stop Time: 1050

Stack Dia. (ft): N/A Bar. Pres. (in. Hg): 30.28 Static Pres. (in Hg): -1.10

Probe Tip Diameter (in): N/A Pitot Factor: 0.840 Meter Factor: 0.996 SN# 1226

Control Number: N/A K Factor: N/A

Percent O_2: N/A Percent CO_2: N/A Percent $CO+N_2$: N/A

Pre-Leak Checks: Pitots: ok System: ok @ 13" Hg < 0.01

Post-Leak Checks: Pitots: ok System: ok @ 12" Hg < 0.01

Point	Sample Time	Dry Gas Meter Reading	ΔP Inches H_2O	ΔH Inches H_2O	Dry Gas Meter Temperature °F		LVAC. In. Hg Gauge	Dryer Temp. °F	Probe Temp. °F	Oven Temp. °F	Stack Temp. °F
		733.100			Inlet	Outlet					
1	5-0/1020	736.8		2.0	75	74	6.0	75			
2	5-0/1025	740.5		2.0	77	74	6.0	67			
3	5-0/1030	744.1		2.0	78	75	6.0	63			
4	5-0/1035	747.8		2.0	80	77	6.0	61			
5	5-0/1040	751.6		2.0	83	78	6.0	61			
6	5-0/1045	755.369		2.0	85	80	6.0	62			
7	~~5-0/~~										
8											
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	30	22.269	-	2.000	78						-

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Environmental Services Company, Inc.

IMPINGER CATCH

Customer: GP Crossett

Sampling Location: SN-30 Sample Date: 9/25/01

Run Number: 1 Control Number: N/A

Impinger Number	Solution Used	Amount of Solution (milliliters)	Weight (grams)
1	DI H_2O	100 ml	Final 744.5 Initial 684.6 Weight gain 59.9
2	DI H_2O	100 ml	Final 723.4 Initial 709.7 Weight gain 13.7
3	Empty	0	Final 627.7 Initial 626.8 Weight gain 0.9
4	silica gel	200 g	Final 911.8 Initial 909.1 Weight gain 2.7

TOTAL WEIGHT GAIN OF IMPINGERS (GRAMS) 77.2

Date: 9/25/01

Signature:

Laboratory Data

Attached is a copy of the laboratory report from the analysis of the samples. Also attached is a copy of the chain of custody used to submit the samples to the laboratory.

Environmental Services Company, Inc.

CORPORATE OFFICE:
13715 W. MARKHAM - P.O. BOX 55146
LITTLE ROCK, ARKANSAS 72215
501-221-2565 FAX: 501-221-1341
E-MAIL: corporate@esclabs.com
Website: www.esclabs.com

NORTHWEST BRANCH:
1107 CENTURY
SPRINGDALE, ARKANSAS 72762
501-750-1170 FAX: 501-750-1172
E-MAIL: nwbranch@esclabs.com
Website: www.esclabs.com

LABORATORY RESULTS

Chlorine and Chlorine Dioxide

Control Number	Identification	ml of titrant required to reach first endpoint	ml of titrant required to reach second endpoint
0109010420	SN-30 Run #1	ND	ND
0109010421	SN-30 Run #2	ND	ND
0109010422	SN-30 Run #3	ND	ND
0109010423	Blank	ND	ND

* The first endpoint (which signifies the presence of chlorine) was never reached. Therefore, all results were reported as ND

Ned Y. Ryerson
Analyst Signature

October 2, 2001
Date

SORRELLS RESEARCH
LABORATORY AND FIELD SERVICES

CHEMISTS
ECOLOGISTS
CONSULTANTS
PLANNERS

8002 Stanton Road
Little Rock, Arkansas 72209

Phone 501-562-8139
Fax 501-562-7025
Toll Free 1-800-331-8139

LABORATORY ANALYSIS

Date of Report: October 12, 2001
Date Received : October 1, 2001

For: ENVIRONMENTAL SERVICES COMPANY, INC.
13715 W. MARKHAM
LITTLE ROCK, AR 72215-
Job: CONTRACT ANALYSIS / P.O.# 3168
Sample From: SAMPLE IDENT / 0109010417 / CHARCOAL GRAB / SN-30 RUN 1

ANALYTE		RESULT	UNITS	METHOD
Chloroform, Run 1, A tube		5.600	ug/tube	ORBO22
Chloroform, Run 1, B tube	<	0.200	ug/tube	ORBO22
Chloroform, Run 1, C tube	<	0.200	ug/tube	ORBO22

STANDARD METHODS, 18TH ED.; EPA METHODS, 3RD ED.
Collected by:
JEFF WOOSON on 09/25/01 at 10:52
Analysis by :
SEE ATTACHED QUALITY ASSURANCE PAGE.
Sample preservation and Laboratory Analysis conducted according to EPA 40 CFR Part 136. Test/Analyst/Time/Coeff./Var./ QA plan filed with ADPC&E. Includes 10 % replication and 10 % recovery studies by random selection. Instruments maintained and calibrated and records kept.
See Attached.

Copies to:
MRS. JOYCE BROWN
P.O. BOX 55146
13715 W. MARKHAM
LITTLE ROCK, AR 72215-

MS. SIDNEY BRACKEEN
1107 CENTURY STREET
SPRINGDALE, AR 72764-

Laboratory Number: Z842.001 ES2 Reviewed By: K. E. Sorrells, M.S. [✓]

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QUALITY ASSURANCE

October 1, 2001
The following QA represents SRA's Quality Assurance values for this report.

ANALYTE	ANALYST	BEG. DATE	BEG. TIME	FIN. DATE	FIN. TIME	S.D. %	SPK. REC.	#IN BAT
Chloroform	KESII	10/11/01	1439	10/11/01	1915	2.30	104.0	11

Field PH/TEMP/D.O. Sampler or Courier/ at time of sampling or pick up Sample preservation and laboratory analysis conducted according to EPA 40 CFR Part 136 TEST/ANALYST/TIME/COEF. VAR.* QA PLAN filed with ADPC&E. Include replication.

KES = K. E. Sorrells
JBS = James B. Sorrells
CAS = Cecil A. Sorrells
MKM = Mark Kyle McKenzie
KESII = K. E. Sorrells, II
TJS = Todd J. Sanders
JHD = J. Henry Dodson

Laboratory Number: Z842.001 ES2

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LABORATORY ANALYSIS

Date of Report: October 12, 2001
Date Received : October 1, 2001

For: ENVIRONMENTAL SERVICES COMPANY, INC.
13715 W. MARKHAM
LITTLE ROCK, AR 72215-
Job: CONTRACT ANALYSIS / P.O.# 3168
Sample From: SAMPLE IDENT / 0109010418 / CHARCOAL GRAB / SN-30 RUN 2

ANALYTE		RESULT	UNITS	METHOD
Chloroform, Run 2, A tube		5.900	ug/tube	ORBO22
Chloroform, Run 2, B tube	<	0.200	ug/tube	ORBO22
Chloroform, Run 2, C tube	<	0.200	ug/tube	ORBO22

STANDARD METHODS, 3RD ED.; EPA METHODS 3RD ED.
Collected by:
JEFF WOOSON on 09/25/01 at 11:36
Analysis by :
SEE ATTACHED QUALITY ASSURANCE PAGE.
Sample preservation and Laboratory Analysis conducted according to EPA 40 CFR Part 136. Test/Analyst/Time/Coeff./Var./ QA plan filed with ADPC&E. Includes 10 % replication and 10 % recovery studies by random selection. Instruments maintained and calibrated and records kept.
See Attached.

Copies to:
MRS. JOYCE BROWN
P.O. BOX 55146
13715 W. MARKHAM
LITTLE ROCK, AR 72215-

MS. SIDNEY BRACKEEN
1107 CENTURY STREET
SPRINGDALE, AR 72764-

Laboratory Number: Z842.002 ES2 Reviewed By: K. E. Sorrells, M.S. [signature]

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Fax 501-562-7025
Toll Free 1-800-331-8139

QUALITY ASSURANCE

October 1, 2001
The following QA represents SRA's Quality Assurance values for this report.

ANALYTE	ANALYST	BEG. DATE	BEG. TIME	FIN. DATE	FIN. TIME	S.D. %	SPK. REC.	#IN BAT
Chloroform	KESII	10/11/01	1439	10/11/01	1915	2.30	104.0	11

Field PH/TEMP/D.O. Sampler or Courier/ at time of sampling or pick up Sample preservation and laboratory analysis conducted according to EPA 40 CFR Part 136 TEST/ANALYST/TIME/COEF. VAR.* QA PLAN filed with ADPC&E. Include replication.

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JBS = James B. Sorrells
CAS = Cecil A. Sorrells
MKM = Mark Kyle McKenzie

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TJS = Todd J. Sanders
JHD = J. Henry Dodson

Laboratory Number: Z842.002 ES2

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LABORATORY ANALYSIS

Date of Report: October 12, 2001
Date Received : October 1, 2001

For: ENVIRONMENTAL SERVICES COMPANY, INC.
13715 W. MARKHAM
LITTLE ROCK, AR 72215-
Job: CONTRACT ANALYSIS / P.O.# 3168
Sample From: SAMPLE IDENT / 0109010419 / CHARCOAL GRAB / SN-30 RUN 3

ANALYTE		RESULT	UNITS	METHOD
Chloroform, Run 3, A tube	<	6.550	ug/tube	ORBO22
Chloroform, Run 3, B tube	<	0.200	ug/tube	ORBO22
Chloroform, Run 3, C tube	<	0.200	ug/tube	ORBO22

STANDARD METHODS, 18TH ED.; EPA METHODS, 3RD ED.
Collected by:
JEFF WOOSON on 09/25/01 at 12:15
Analysis by :
SEE ATTACHED QUALITY ASSURANCE PAGE.
Sample preservation and Laboratory Analysis conducted according to EPA 40 CFR Part 136. Test/Analyst/Time/Coeff./Var./ QA plan filed with ADPC&E. Includes 10 % replication and 10 % recovery studies by random selection. Instruments maintained and calibrated and records kept.
See Attached.

Copies to:
MRS. JOYCE BROWN
P.O. BOX 55146
13715 W. MARKHAM
LITTLE ROCK, AR 72215-

MS. SIDNEY BRACKEEN
1107 CENTURY STREET
SPRINGDALE, AR 72764-

Laboratory Number: Z842.003 ES2 Reviewed By: K. E. Sorrells, M.S.

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QUALITY ASSURANCE

October 1, 2001
The following QA represents SRA's Quality Assurance values for this report.

ANALYTE	ANALYST	BEG. DATE	BEG. TIME	FIN. DATE	FIN. TIME	S.D. %	SPK. REC.	#IN BAT
Chloroform	KESII	10/11/01	1439	10/11/01	1915	2.30	104.0	11

Field PH/TEMP/D.O. Sampler or Courier/ at time of sampling or pick up Sample preservation and laboratory analysis conducted according to EPA 40 CFR Part 136 TEST/ANALYST/TIME/COEF. VAR.* QA PLAN filed with ADPC&E. Include replication.

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JHD = J. Henry Dodson

Laboratory Number: Z842.003 ES2

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LABORATORY ANALYSIS

Date of Report: October 12, 2001
Date Received : October 1, 2001

For: ENVIRONMENTAL SERVICES COMPANY, INC.
13715 W. MARKHAM
LITTLE ROCK, AR 72215-
Job: CONTRACT ANALYSIS / P.O.# 3168
Sample From: SAMPLE IDENT / 0109010424 / CHARCOAL GRAB / SN-30 BLANK

ANALYTE		RESULT	UNITS	METHOD
Chloroform, Blank tube	<	0.200	ug/tube	ORBO22

STANDARD METHODS, 18TH ED.; EPA METHODS, 3RD ED.
Collected by:
JEFF WOOSON on 09/25/01 at 14:20
Analysis by :
SEE ATTACHED QUALITY ASSURANCE PAGE.
Sample preservation and Laboratory Analysis conducted according to EPA 40 CFR Part 136. Test/Analyst/Time/Coeff./Var./ QA plan filed with ADPC&E. Includes 10 % replication and 10 % recovery studies by random selection. Instruments maintained and calibrated and records kept.
See Attached.

Copies to:
MRS. JOYCE BROWN
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SPRINGDALE, AR 72764-

Laboratory Number: Z842.004 ES2 Reviewed By: K. E. Sorrells, M.S. [illegible]

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QUALITY ASSURANCE

October 1, 2001
The following QA represents SRA's Quality Assurance values for this report.

ANALYTE	ANALYST	BEG. DATE	BEG. TIME	FIN. DATE	FIN. TIME	S.D. %	SPK. REC.	#IN BAT
Chloroform	KESII	10/11/01	1439	10/11/01	1915	2.30	104.0	11

Field PH/TEMP/D.O. Sampler or Courier/ at time of sampling or pick up Sample preservation and laboratory analysis conducted according to EPA 40 CFR Part 136 TEST/ANALYST/TIME/COEF. VAR.* QA PLAN filed with ADPC&E. Include replication.

KES = K. E. Sorrells
JBS = James B. Sorrells
CAS = Cecil A. Sorrells
MKM = Mark Kyle McKenzie

KESII = K. E. Sorrells, II
TJS = Todd J. Sanders
JHD = J. Henry Dodson

Laboratory Number: Z842.004 ES2

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Little Rock, AR 72215
website: www.esclabs.com
Phone: 501-221-2565 Fax: 501-221-1341

Environmental Services Company, Inc.
Northwest Branch
1107 Century
Springdale, AR 72764
Phone 501-750-1170 Fax : 501-750-1172

CHAIN OF CUSTODY

Client Information

Company Name: GP CROSSETT PAPER (FOR ESC ACCT)
Address: 100 PAPER MILL ROAD
CROSSETT AR 71635
Telephone: 870 567 8482
Additional Num.
FAX: 870 364 9076
ESC Client Number: 1511

Project Information

Permit/Project #:
Purchase Order #:
Work Order # 4593
Sampler Name(s): JEFF WOODLEY
and Signature(s):

Requested Parameters

Chlorophenolics Penncast	Cl + ClO_2 per NCASI
✓	
✓	
✓	
	✓
	✓
	✓
	✓
✓	

Sample Identification / Collection / Containers

Identification	ESC Control #	Date	Time	Type	Matrix	Container Type	Volume	Preservative	#
SN-30 Run #1	01090010417	09/29/01	1022-1052	GRAB	CHARCOAL	CHARCOAL TUBES	N/A	N/A	3
SN-30 Run #2	01090010418		1106-1136						3
SN-30 Run #3	01090010419		1145-1215						3
SN-30 Run #1	01090010420		1225-1255		ICE	40ML VOA VIAL	AS MARKED		1
SN-30 Run #2	01090010421		1303-1333						1
SN-30 Run #3	01090010422		1338-1408						1
SN-30 Cl + ClO_2 BLK	01090010423		1415						1
SN-30 CHLOR. BLK.	01090010424		1420		CHARCOAL	CHARCOAL TUBES	N/A		31

Relinquished By (Signature and Printed Name)	Date	Time	Received By: (Signature and Printed Name)	Date	Time
JEFF WOODLEY	10/01/01	1040			
Relinquished By (Signature and Printed Name)	Date	Time	Received By: (Signature and Printed Name)	Date	Time
Relinquished By: (Signature and Printed Name)	Date	Time	Received for Lab By: (Signature and Printed Name)	Date	Time
			Ned T. Ryerson Ned T. Ryerson	10/01/01	1040

Custody Seals: Used? Intact?
Turnaround: Regular Special
Were samples properly preserved: Yes No

Cool all samples to 4 degrees C.

Comments:

Flow Data	Field Test	Time	Analyst	Result	Result	Units
Analyst:	pH:					
Time:	Temp.:					°C °F
Reading:	DO:					
Units:	Debris:					
Chlorinated? Y N	Fecal Start:					

This Document is Page 1 of 2

Quality Assurance

Pitot Tubes

The pitot tubes used during this test program were fabricated according to the specifications described and illustrated in 40 CFR Part 60, Appendix A, Method 1 through 5. The pitot tubes comply with the alignment specifications in Method 2, Section 2; and the pitot tube assemblies were in compliance with specifications prescribed in the same section.

Metering Systems

The test meters were calibrated according to Method 5, Section 5.3. A copy of the latest calibration for the test meter used in this test program, as outlined in Section 5.3.2 is attached.

Temperature Gauges

All thermometers were calibrated against a reference thermocouple that was certified against a National Bureau of Standards (NSB) traceable mercury-in-glass thermometers as outlined in Approved Alternative Method ALT-011.

DRY GAS METER CALIBRATION REPORT

Customer: Environmental Services Co., Inc. Date: 5/6/97

Console Serial # 1226

DGM # 3624279 Reference Meter Serial # 554840

Barometric Pressure, P_b: 29.70 in. Hg 1226-cal.XLS

RUN	1	2	3	Units
Orifice Manometer Setting, ΔH	2.00	0.75	6.00	in. H_2O
Elapsed Time	14.00	22.00	8.00	min.
Reference Meter				
Final Volume Reading	697.0830	708.1600	719.6760	ft^3
Initial Volume Reading	686.0800	697.2930	708.8390	ft^3
Total Gas Volume, V_w	11.0030	10.8670	10.8370	ft^3
Temperature, Initial	71.00	70.00	70.00	°F
Temperature, Final	70.00	70.00	71.00	°F
Avg Temperature, T_w	70.50	70.00	70.50	°F
Dry Gas Meter				
Final Volume Reading	13.6150	24.6280	35.9850	ft^3
Initial Volume Reading	2.6840	13.8000	25.2900	ft^3
Total Gas Volume, V_m	10.9310	10.8280	10.6950	ft^3
Temperature, Initial	72.00	73.00	75.00	°F
Temperature, Final	74.00	75.00	80.00	°F
Avg Temperature, T_m	73.00	74.00	77.50	°F
ΔH (a)	1.8248	1.7258	1.8273	Avg. ΔH(a) 1.7926
ΔH (a) Tolerance Check	OK	OK	OK	
Gamma, Y	1.0064	1.0093	1.0116	Avg. Y 1.0091
Gamma Tolerance Check	OK	OK	OK	

Calibration Performed By: William D Ballard

$$\Delta H(a) = \frac{0.0317\,\Delta H}{P_b\,(T_m + 460)} \left[\frac{(T_w + 460)\,\theta}{V_w}\right]^2 \qquad Y = \frac{V_w\,P_b\,(T_m + 460)}{V_m\,(P_b + \Delta H/13.6)\,(T_w + 460)}$$

2142 E. Geer Street, Durham, North Carolina 27704 800-STACKS-5 (782-2575) 919-956-9688 FAX: 919-682-0333

Environmental Services Co., Inc.
EPA Method 5
ESC Meter Box Calibration
Post-Test Orifice Method
English Meter Box Units, English K' Factor

Model #: C-5000
Serial #: 1226

Date: ----------> 02/26/01
Barometric Pressure: ----------> 30.42 in. Hg
Theoretical Critical Vacuum: ----------> 14.35 in. Hg

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3)*(°R)^{0.05}/((in . Hg)*(min))$.

---------- DRY GAS METER READINGS ----------									-CRIT. ORIFICE READINGS-			AMBIENT TEMPERATURE		
dH	Time	Volume Initial	Volume Final	Volume Total	Initial Temps Inlet	Initial Temps Outlet	Final Temps. Inlet	Final Temps. Outlet	Orifice Serial #	K' Orifice Coeff.	Actual Vacuum	Initial	Final	Average
(in H2O)	(min)	(ft^3)	(ft^3)	(ft^3)	(°F)	(°F)	(°F)	(°F)	(number)	(above)	(in. Hg)	(°F)	(°F)	(°F)
0.61	11.75	439.0	444.0	5.0	64.0	60.0	66.0	62.0	CT48	0.3297	22.5	64.0	64.0	64.0
1.10	8.78	445.0	450.0	5.0	66.0	62.0	68.0	63.0	CT55	0.4379	20.0	65.0	65.0	65.0
1.90	6.82	452.0	457.0	5.0	68.0	64.0	69.0	65.0	CT63	0.5613	19.0	65.0	66.0	65.5
3.70	4.97	459.0	464.0	5.0	70.0	65.0	65.0	66.0	CT73	0.7738	16.0	65.0	65.0	65.0
5.85	4.00	466.0	471.0	5.0	72.0	66.0	74.0	67.0	CT81	0.9652	14.0	64.0	65.0	64.5

-------- DRY GAS METER --------			---------- ORIFICE ----------		DRY GAS METER	---------- ORIFICE ----------			
VOLUME CORRECTED Vm(std) (ft^3)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (ft^3)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (ft^3)	CALIBRATION FACTOR "Y" Value (number)	Variation (number)	CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)
5.138	145.5	5.148	145.8	5.027	1.002	0.006	1.842	46.78	-0.108
5.127	145.2	5.106	144.6	4.996	0.996	0.000	1.881	47.77	-0.069
5.119	145.0	5.077	143.8	4.972	0.992	-0.004	1.972	50.08	0.022
5.142	145.6	5.102	144.5	4.991	0.992	-0.004	2.014	51.17	0.065
5.136	145.5	5.128	145.2	5.012	0.998	0.002	2.041	51.85	0.091
				Average Y ---------->	0.996				
				Average dH@ ---------->			1.950	49.53	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cfm of air at 68°F and 29.92" Hg, acceptable tolerance of individual values from the average is ±0.2.

SIGNED: David Caillouet DATE: 2-26-01

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Environmental Services Co., Inc.

EPA Method 5

ESC Meter Box Calibration

Post-Test Orifice Method

English Meter Box Units, English K' Factor

Model #: C-5000

Serial #: 1226

Date: ---------- 09/21/01

Barometric Pressure: ----------> 30.14 in. Hg

Theoretical Critical Vacuum: ----------> 14.22 in. Hg

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3)*(°R)^{0.05}/((in\ .\ Hg)*(min))$.

---------- DRY GAS METER READINGS ----------									-CRIT. ORIFICE READINGS-			AMBIENT TEMPERATURE		
		Volume	Volume	Volume	Initial Temps		Final Temps.		Orifice	K' Orifice	Actual			
dH	Time	Initial	Final	Total	Inlet	Outlet	Inlet	Outlet	Serial #	Coeff.	Vacuum	Initial	Final	Average
(in H2O)	(min)	(ft^3)	(ft^3)	(ft^3)	(°F)	(°F)	(°F)	(°F)	(number)	(above)	(in. Hg)	(°F)	(°F)	(°F)
1.20	9.00	685.800	691.005	5.205	74.0	73.0	74.0	74.0	CT55	0.4379	22.0	73.4	73.9	73.7
2.00	10.20	691.200	698.717	7.517	74.0	74.0	73.0	73.0	CT63	0.5613	19.5	73.7	73.1	73.4
4.00	7.20	700.000	707.236	7.236	73.0	73.0	74.0	74.0	CT73	0.7738	17.0	73.0	72.4	72.7

---------- DRY GAS METER ----------		---------- ORIFICE ----------		DRY GAS METER	---------- ORIFICE ----------				
VOLUME	VOLUME	VOLUME	VOLUME	VOLUME	CALIBRATION		CALIBRATION FACTOR		
CORRECTED	CORRECTED	CORRECTED	CORRECTED	NOMINAL	FACTOR "Y"		dH@		
Vm(std)	Vm(std)	Vcr(std)	Vcr(std)	Vcr	Value	Variation	Value	Value	Variation
(ft^3)	(liters)	(ft^3)	(liters)	(ft^3)	(number)	(number)	(in H2O)	(mm H2O)	(in H2O)
5.200	147.261	5.142	145.622	5.161	0.989	-0.005	2.062	52.36	-0.055
7.528	213.186	7.472	211.595	7.496	0.993	-0.001	2.090	53.09	-0.026
7.282	206.213	7.276	206.042	7.290	0.999	0.006	2.197	55.80	0.081
				Average Y ---------->	0.994				
				Average dH@ ---------->			2.116	53.75	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cfm of air at 68°F and 29.92" Hg, acceptable tolerance of individual values from the average is ±0.2.

SIGNED: _____ DATE: 09/21/01

Environmental Services Co., Inc.

EPA Method 5

ESC Meter Box Calibration

Post-Test Orifice Method

English Meter Box Units, English K' Factor

Model #: C-5000
Serial #: 1226

Date: ---------- 10/01/01
Barometric Pressure: ----------> 30.12 in. Hg
Theoretical Critical Vacuum: ----------> 14.21 in. Hg

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3)*(°R)^{0.05}/((in . Hg)*(min))$.

		DRY GAS METER READINGS							-CRIT. ORIFICE READINGS-		AMBIENT TEMPERATURE		
dH	Time	Volume Initial	Volume Final	Volume Total	Initial Temps Inlet	Initial Temps Outlet	Final Temps. Inlet	Final Temps. Outlet	Orifice Serial #	K' Orifice Coeff.	Actual Vacuum	Initial	Final	Average
(in H2O)	(min)	(ft^3)	(ft^3)	(ft^3)	(°F)	(°F)	(°F)	(°F)	(number)	(above)	(in. Hg)	(°F)	(°F)	(°F)
1.10	9.00	890.800	896.065	5.265	83.0	78.0	82.0	80.0	CT55	0.4379	22.0	76.2	75.8	76.0
2.00	7.00	896.400	901.640	5.240	81.0	80.0	82.0	80.0	CT63	0.5613	20.0	75.9	76.2	76.1
3.80	5.00	901.900	907.036	5.136	81.0	80.0	82.0	80.0	CT73	0.7738	17.0	76.4	77.1	76.8

DRY GAS METER		ORIFICE		DRY GAS METER	CALIBRATION FACTOR "Y"		ORIFICE CALIBRATION FACTOR dH@		
VOLUME CORRECTED Vm(std)	VOLUME CORRECTED Vm(std)	VOLUME CORRECTED Vcr(std)	VOLUME CORRECTED Vcr(std)	VOLUME NOMINAL Vcr	Value	Variation	Value	Value	Variation
(ft^3)	(liters)	(ft^3)	(liters)	(ft^3)	(number)	(number)	(in H2O)	(mm H2O)	(in H2O)
5.187	146.897	5.127	145.206	5.173	0.988	0.000	1.880	47.75	-0.132
5.174	146.520	5.111	144.757	5.157	0.988	0.000	2.077	52.75	0.065
5.093	144.240	5.030	142.449	5.081	0.988	0.000	2.079	52.80	0.067
				Average Y ---------->	0.988				
				Average dH@ ---------->			2.012	51.10	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cfm of air at 68°F and 29.92" Hg, acceptable tolerance of individual values from the average is ±0.2.

SIGNED: _____ DATE: 10/1/01

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LOW FLOW CRITICAL ORIFICE CALIBRATION

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY

CRITICAL ORIFICE SET S/N: 2623LF

REFERENCE DRY GAS METER

DATE: 4/12/99

SERIAL NUMBER: 3470258

GAS METER P/N: DTM-115

BAR. PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	29.54	29.54	29.54

LEAK CHECK: OK

ORIFICE NOMINAL FLOW (LPM)	RUN #	CRITICAL VACUUM (in Hg)	TESTED VACUUM (in Hg)	DGM READINGS (LITERS) INITIAL	DGM READINGS (LITERS) FINAL	DGM READINGS (LITERS) NET (V_m)	TEMPERATURES °F AMBIENT	TEMPERATURES °F DGM INITIAL	TEMPERATURES °F DGM FINAL	TEMPERATURES °F DGM AVG	ELAPSED TIME (MIN) θ	DGM PRESSURE P_m (in H_2O)	K' FACTOR *	K' FACTOR VARIATION (%)	AVG VOLUMETRIC FLOW RATE (LITERS/MIN)
0.57	1	15	18	425.438	432.224	6.786	67	67	67	67	14.00	0.90	0.3717	1.23	0.48
	2	15	18	432.224	438.918	6.694	67	67	67	67	14.00	0.90	0.3666	-0.14	
	3	15	18	438.918	445.548	6.630	67	67	67	67	14.00	0.90	0.3631	-1.09	
													AVG K' FACTOR =	0.3672	
1.10	1	15	18			.0				0			#DIV/0!	#DIV/0!	#DIV/0!
	2	15	18			.0				0			#DIV/0!	#DIV/0!	
	3	15	18			.0				0			#DIV/0!	#DIV/0!	
													AVG K' FACTOR =	#DIV/0!	
2.00	1	15	18	472.496	479.392	6.896	69	69	69	69	4.00	1.90	1.3228	-0.16	1.73
	2	15	18	479.392	486.287	6.895	69	69	69	69	4.00	1.90	1.3226	-0.17	
	3	15	18	486.287	493.217	6.930	69	69	69	69	4.00	1.90	1.3293	0.33	
													AVG K' FACTOR =	1.3249	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

Calculate the standard volumes of air passed through the DGM and the critical orifices, and calculate the DGM calibration factor, Y, by entering the data in the outlined fields above (equations are programmed on the spreadsheet included with each orifice set).

* Critical Orifice Coefficient = $K' = \dfrac{K_1 V_m Y (P_{bar} + P_m/13.6) \sqrt{T_{amb}}}{P_{bar} T_m \theta}$

Critical Orifice Set number 2623LF was calibrated in accordance with standard calibration practices using a calibrated reference dry gas meter

Signature

12 APRIL 99

Date

K_1 = 17.64 °R/In. Hg (English)
= 0.3858 °K/mm Hg (Metric)

T_{amb} = Absolute ambient temperature, °R (English), °K (Metric)

T_m = Absolute DGM avg. temperature, °R (English), °K (Metric)

LOW FLOW CRITICAL ORIFICE CALIBRATION

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY

CRITICAL ORIFICE SET S/N: 2623LF

REFERENCE DRY GAS METER

DATE: 4/29/99

SERIAL NUMBER: 3470258

GAS METER P/N: DTM-115

BAR. PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	29.78	29.78	29.78

LEAK CHECK: OK

ORIFICE NOMINAL FLOW (LPM)	RUN #	CRITICAL VACUUM (In Hg)	TESTED VACUUM (In Hg)	DGM READINGS (LITERS) INITIAL	DGM READINGS (LITERS) FINAL	DGM READINGS (LITERS) NET (V_m)	TEMPERATURES °F AMBIENT	TEMPERATURES °F DGM INITIAL	TEMPERATURES °F DGM FINAL	TEMPERATURES °F DGM AVG	ELAPSED TIME (MIN) θ	DGM PRESSURE P_m (In H_2O)	K' FACTOR *	K' FACTOR VARIATION (%)	AVG VOLUMETRIC FLOW RATE (LITERS/MIN)
0.67	1	15	18			.0				0			#DIV/0!	#DIV/0!	#DIV/0!
	2	15	18			.0				0			#DIV/0!	#DIV/0!	
	3	15	18			.0				0			#DIV/0!	#DIV/0!	
												AVG K' FACTOR =	#DIV/0!		
1.10	1	15	18	433.485	441.349	7.864	66	66.5	66	66.25	8.00	1.90	0.7560	0.60	0.98
	2	15	18	441.349	449.066	7.717	66	66	67.5	66.75	8.00	1.90	0.7411	-1.37	
	3	15	18	449.066	456.965	7.899	66	67.5	68	67.75	8.00	1.90	0.7572	0.77	
												AVG K' FACTOR =	0.7514		
2.00	1	15	18			.0				0			#DIV/0!	#DIV/0!	#DIV/0!
	2	15	18			.0				0			#DIV/0!	#DIV/0!	
	3	15	18			.0				0			#DIV/0!	#DIV/0!	
												AVG K' FACTOR =	#DIV/0!		

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

Calculate the standard volumes of air passed through the DGM and the critical orifices, and calculate the DGM calibration factor, Y, by entering the data in the outlined fields above (equations are programmed on the spreadsheet included with each orifice set).

* Critical Orifice Coefficient = $K' = \dfrac{K_1 V_m Y (P_{bar} + P_m/13.6)\sqrt{T_{amb}}}{P_{bar} T_m \theta}$

Critical Orifice Set number 2623LF was calibrated in accordance with standard calibration practices using a calibrated reference dry gas meter

Signature

29 APRIL 99

Date

K_1 = 17.64 °R/In. Hg (English)
= 0.3858 °K/mm Hg (Metric)

T_{amb} = Absolute ambient temperature, °R (English), °K (Metric)

T_m = Absolute DGM avg. temperature, °R (English), °K (Metric)

DRY GAS METER CALIBRATION USING LOW FLOW CRITICAL ORIFICES

1) Select the orifice closest to the expected operating flow rate and insert in meterbox inlet.
2) For pretest calibration, leak check the system. Leak checking is not necessary for post-test calibrations.
3) Set vacuum as close as possible to the Orifice Calibration Report tested vacuum.
4) Observe the DGM dial, start timing as the needle passes the zero reference. Allow a minimum of 5 revolutions (pretest) or 3 revolutions (post-test) and stop timing again at the zero reference.
5) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 10/11/01

METER SERIAL #: 159484

CRITICAL ORIFICE SET SERIAL #: 2623LF

	INITIAL	FINAL	AVG (P_{bar})
Bar. Pressure (in Hg.)	29.98	29.98	29.98

Each Y must be ± 2.0% from the average (pretest) or ± 5.0% from the average (post-test).

ORIFICE NOMINAL FLOW (LPM)	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (Liters) INITIAL	DGM READINGS (Liters) FINAL	DGM READINGS (Liters) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME θ (Min.00)	DGM PRESSURE P_m (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION
0.50	1	0.3672	23.5	2703.00	2708.19	5.190	73.4	72.6	72.7	72.8	72.6	72.7	10.80	0.20	5.1582	5.1494	0.9983	0.71
	2	0.3672	23.5	2709.00	2714.31	5.310	71.0	72.8	72.2	72.6	72.0	72.4	10.90	0.20	5.2802	5.2088	0.9865	-0.48
	3	0.3672	23.5	2715.00	2722.54	7.540	68.4	72.2	71.2	72.0	71.0	71.6	15.50	0.20	7.5090	7.4253	0.9888	-0.24

AVG Y @ 0.50 LPM = 0.9912

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

(1) $V_m(std) = K_1 V_m \frac{P_{bar} + (P_m/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr}(std) = K' \sqrt{\frac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \frac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

ESC Personnel

The staff of Environmental Services Company is comprised of knowledgeable, experienced personnel. Each individual brings to each project his or her unique contribution. Only persons of the highest standards remain part of the ESC team. Brief resumes of key personnel follow.

R. STEVEN WOOSLEY

CURRENT POSITION

VICE PRESIDENT AND CHIEF OPERATING OFFICER

SUMMARY OF QUALIFICATIONS

AFTER GRADUATION FROM OUACHITA BAPTIST UNIVERSITY IN 1982, MR. WOOSLEY JOINED FAIRFIELD COMMUNITIES, HEADQUARTERED IN LITTLE ROCK, ARKANSAS. SERVING AS INTERNAL AUDITOR, MR. WOOSLEY WAS RESPONSIBLE FOR THE AUDITING OF NINE FAIRFIELD OPERATIONS THROUGHOUT THE UNITED STATES. IN 1983, HE ACCEPTED A POSITION WITH GLENN REED COMPANY, A NATIONAL ACCOUNTING FIRM.

IN 1985, MR. WOOSLEY JOINED ENVIRONMENTAL SERVICES COMPANY, INC., WHERE HIS DIVERSE RESPONSIBILITIES INCLUDED COMPUTER PROGRAMMING, FIELD SERVICES, FINANCIAL PLANNING AND TECHNICAL ANALYSIS. MR. WOOSLEY TRANSFERRED FROM THE CORPORATE HEADQUARTERS TO THE NORTHWEST ARKANSAS BRANCH OF THE COMPANY IN JANUARY 1989. THERE HE MANAGED ALL ASPECTS OF THE BRANCH LABORATORY, FROM MARKETING TO FIELD SERVICES AND SPECIALIZED IN THE COMPANY'S AIR TESTING AND CONSULTATION DEPARTMENT.

IN 1991, HE RETURNED TO LITTLE ROCK TO ASSUME NEW RESPONSIBILITIES AS CHIEF OPERATING OFFICER. PRESENTLY, MR. WOOSLEY OVERSEES ALL FACETS OF THE ESC ORGANIZATION, WORKING CLOSELY WITH COMPANY LABORATORY DIRECTORS, CLIENTS AND PROJECT COORDINATORS. HE HEADS THE CORPORATE AIR DIVISION AND PROVIDES HANDS ON SUPERVISION OF INDUSTRIAL STACK TESTING. BECAUSE OF HIS UNIQUE BACKGROUND THAT SYNTHESIZES STRONG BUSINESS PRINCIPALS, ATTENTION TO DETAIL AND USE OF TECHNOLOGY, MR. WOOSLEY IS PARTICULARLY SUITED FOR HIS ROLE AS CHIEF OPERATING OFFICER.

EDUCATION

B.S., OUACHITA BAPTIST UNIVERSITY
CONTINUING EDUCATION COURSES IN HAZARDOUS WASTE MANAGEMENT GOVERNMENT REGULATION FROM THE ENVIRONMENTAL FEDERATION AGENCY (REGION VI), ARKANSAS FEDERATION OF WATER & AIR USERS, THE TEXAS NATURAL RESOURCES CONSERVATION COMMISSION AND VARIOUS PROFESSIONAL EDUCATION ORGANIZATIONS.

CERTIFICATIONS AND AFFILIATIONS

AMERICAN WATER, WASTEWATER & POLLUTION CONTROL ASSN.
ARKANSAS WATER, WASTEWATER & POLLUTION CONTROL ASSN.
AMERICAN OIL CHEMISTS' SOCIETY
ENVIRONMENTAL ASSESSMENT ASSOCIATION

OZARK FOOD PROCESSORS ASSOCIATION
ARKANSAS WATER AND WASTEWATER ASSOCIATION
ARKANSAS ENVIRONMENTAL FEDERATION
HAZWOPER SUPERVISOR
CPR
CERTIFIED ENVIRONMENTAL INSPECTOR
STATE OF ARKANSAS VISIBLE EMISSIONS EVALUATOR

JEFFERY N. WOOSLEY

CURRENT POSITION

SPECIAL PROJECTS MANAGER

SUMMARY OF QUALIFICATIONS

MR. WOOSLEY'S UNDERGRADUATE COURSE WORK INCLUDES A VARIETY OF SUBJECTS SUCH AS SEVERAL YEARS OF ENGINEERING AND CHEMISTRY. WHILE A STUDENT, MR. WOOSLEY WORKED PART-TIME FOR ENVIRONMENTAL SERVICES COMPANY, INC. IN ITS AIR TESTING DIVISION. HE RECEIVED A DEGREE IN MATHEMATICS AND STATISTICS IN 1990 FROM THE UNIVERSITY OF ARKANSAS AT LITTLE ROCK. AFTER GRADUATION HE ACCEPTED A POSITION WITH CHRYSLER FIRST COMMERCIAL CORPORATION AS A CLIENT SERVICES REPRESENTATIVE AND WAS RESPONSIBLE FOR MID-SOUTH REGIONS OF ARKANSAS, LOUISIANA, OKLAHOMA AND MISSISSIPPI.

IN 1993, MR. WOOSLEY ACCEPTED A POSITION WITH ENVIRONMENTAL SERVICES COMPANY IN ITS AIR TESTING DIVISION. MR. WOOSLEY BECAME A PROJECT MANAGER IN 1996 AND CURRENTLY SERVES AS SPECIAL PROJECTS MANAGER, A POSITION HE ASSUMED IN 2001. HE HAS PERFORMED AIR EMISSIONS TESTING AND CONSULTATION FOR A VARIETY OF COMPANIES, INCLUDING GEORGIA PACIFIC CORPORATION, INTERNATIONAL PAPER COMPANY, WEYERHAEUSER CORPORATION, FIRESTONE BUILDING PRODUCTS, GREAT LAKES CHEMICAL, RINGIER AMERICA, BRYCE CORPORATION, CON-AGRA, GNB INDUSTRIAL BATTERY, VIRCO MANUFACTURING AND AOC RESINS, AMONG OTHERS. HIS RESPONSIBILITIES ALSO INCLUDE A VARIETY OF CONSULTATION SERVICES, INCLUDING AIR PERMITTING, FOR E.S.C., INC AND ITS CLIENTELE.

EDUCATION

UNIVERSITY OF ARKANSAS AT LITTLE ROCK- LITTLE ROCK, ARKANSAS

CERTIFICATIONS AND AFFILIATIONS

STATE OF ARKANSAS VISIBLE EMISSIONS EVALUATOR

JAMES A. NARENS, III

CURRENT POSITION

ORGANIC CHEMIST—AIR DIVISION

SUMMARY OF QUALIFICATIONS

WHILE WORKING ON A BACHELORS OF SCIENCE FROM THE UNIVERSITY OF ARKANSAS AT FAYETTEVILLE, MR. NARENS WORKED AS A MANAGER FOR A SHIPPING COMPANY AS WELL AS IN THE CONSTRUCTION INDUSTRY. THEREAFTER, HE BEGAN WORKING AT ESC IN THE ORGANICS LABORATORY. HERE HE WAS RESPONSIBLE FOR COMPLEX ORGANIC EXTRACTIONS, INSTRUMENTATION, AND REPORTING. IN 2001, HE TRANSFERRED TO THE ESC AIR DIVISION.

HIS EXTENSIVE INTERACTION WITH THE GENERAL PUBLIC DURING THIS EMPLOYMENT HAS PROVIDED HIM WITH PRACTICAL EXPERIENCE IN DEALING WITH A VARIETY OF PERSONALITIES AND SITUATIONS. HE USES THIS ABILITY ON A DAILY BASIS WITHIN THE ESC STRUCTURE BY COORDINATING EVERY ASPECT OF AIR TESTING PROJECTS FROM INITIAL SITE PREPARATION TO ORGANIZATION OF SUPPLIES AND EQUIPMENT.

AT ENVIRONMENTAL SERVICES COMPANY, INC. HE SERVES AS CHEMIST IN THE WET CHEMISTRY DIVISION. MR. MULVANEY IS EXPERIENCED IN ANALYSIS USING INSTRUMENTAL AND WET CHEMISTRY TECHNIQUES. HE IS CURRENTLY WORKING ON HIS PHD IN CHEMISTRY.

EDUCATION

B.S. MICROBIOLOGY – UNIVERSITY OF ARKANSAS

ASSOCIATES OF SCIENCE – TEXARKANA COLLEGE

CERTIFICATIONS AND AFFILIATIONS

CERTIFIED VISIBLE EMISSIONS EVALUATOR
DALE CARNEGIE COMMUNICATIONS AWARD RECIPIENT
BOY SCOUTS OF AMERICA—EAGLE SCOUT
OLYMPIC TRAINING CENTER—FOIL INSTRUCTOR DEGREE